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USSN: 09/729,939 571/273-8300

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1. Communication Accompanying Resubmission of Appeal Brief
2. Appeal Brief

Total number of pages, including cover page: 26

Appl. No. 09/729,939
Amdt. dated January 16, 2006
Response to final Office Communication of January 9, 2006

I hereby certify that this correspondence is being faxed to the Commissioner For Patents, Alexandria, VA 22313, on January 16, 2006 by Jon D. Shutter (Reg. No. 41,311).

Signature

PATENT
Case No. N0080US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	09/729,939
Applicant	:	Rajashri Joshi et al.
Filed	:	December 5, 2000
Titled	:	Method and System for Representation of Geographic Features In a Computer-based System
TC/A.U.	:	2164
Examiner	:	Mellissa M. Chojnacki
Docket No.	:	N0080US
Customer No.	:	37583

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

COMMUNICATION ACCOMPANYING
RESUBMISSION OF APPEAL BRIEF

Sir:

A Communication from the Patent Office mailed January 9, 2006, identified certain informalities in the Appeal Brief filed on October 19, 2005. Accompanying this response is a timely filed revised Appeal Brief that addresses the noted informalities.

Respectfully submitted,

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APPEAL BRIEF

This appeal brief is submitted pursuant to 37 CFR 41.37. This is an appeal of the final Office Action dated April 21, 2005. A Notice of Appeal was filed on July 20, 2005.

(1) REAL PARTY IN INTEREST

The real party in interest is NAVTEQ North America, LLC (formerly named Navigation Technologies Corporation), a publicly-traded corporation that has its headquarters in Chicago, Illinois.

(2) RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

(3) STATUS OF CLAIMS

Claims 1-3, 8-14, 16-27, 29-34 and 36-37 were rejected under 35 USC 102(b) as anticipated by Sennott (U.S. Pat. No. 5,438,517).

Claims 4, 15, 28 and 35 were rejected under 35 USC 103(a) as obvious over Sennott in view of Dayanand (U.S. Pat. No. 6,639,592).

Claims 5-7 were rejected 35 USC 103(a) as obvious over Sennott in view of Rohm (U.S. Pat. No. 6,253,164).

Claims 1-37 have been appealed.

(4) STATUS OF AMENDMENTS

There has been no amendment filed subsequent to the final rejection.

(5) SUMMARY OF INVENTION

Independent Claim 1 relates to a method for representing geographic features in a computer-based system (page 3, lines 18-19; FIG. 5). The method includes providing a first database (page 4, lines 15-16; 14 in FIG. 4) that stores a plurality of data points (page 5, lines 7-8; 22 in FIG. 5). The data points specify latitude and longitude coordinates of locations along a geographic feature (page 4, lines 26-29; 15 in FIG. 4). The method also includes fitting a polynomial spline to the geographic feature to generate a plurality of control points (page 6, lines 24-26; 26 in FIG. 5) and storing the control point in a second database (page 6, lines 31-32, 16 in FIG. 4, 28 in FIG. 5). The control points are generated by applying a least squares approximation to the data points (page 6, lines 24-26). The control points may be used to represent the geometry of the geographic feature (page 16, lines 27-32).

Independent Claim 14 relates to a method of displaying on a computer output device a function representing a geographic feature (page 16, lines 21-22; FIG. 9). The method includes retrieving from a database (page 16, line 23; 54 in FIG. 8) a plurality of spline control points associated with the geographic feature (page 16, lines 28-29; 82 in FIG. 9). The spline control points being derived using a least squares approximation from a plurality of data points (page 6, lines 24-26). The data points specify latitude and longitude coordinates of locations along the geographic feature (page 4, lines 26-29; 15 in FIG. 4). The method also includes calculating a polynomial spline using the spline control points to generate the function representing the geographic feature (page 16, lines 29-30; 84 in FIG. 9) and displaying the function on the computer output device (page 16, lines 30-32; 86 in FIG. 9).

Independent Claim 16 relates to a method of generating a computer-usable database that represents feature geometry (page 3, lines 18-19; FIG. 5). The method includes providing a predetermined database (page 4, lines 15-16; 14 in FIG. 4) that represents feature geometry using a plurality of data points (page 5, lines 7-8; 22 in FIG. 5). The data points specify latitude and longitude coordinates of locations along the geographic features (page 4, lines 26-29; 15 in FIG. 4). The method also includes retrieving a corresponding set of data points for each of the geographic features and fitting a polynomial spline to each of the geographic features by computing a plurality of control points yielding the least squares approximation to the corresponding set of data points (page 6, lines 24-26; 26 in FIG. 5). The method further includes storing the spline control point in the computer-usable database (page 6, lines 31-32, 28 in FIG. 5).

Independent Claim 23 relates to a system for displaying a function representing the geometry of a geographic feature (page 16, lines 21-22; FIG. 8). The system includes a database

storing spline control points associated with the geographic feature (page 16, line 23; 54 in FIG. 8). The spline control points being derived using a least squares approximation from a plurality of data points (page 6, lines 24-26). The data points specify latitude and longitude coordinates of locations along a geographic feature (page 4, lines 26-29; 15 in FIG. 4). The system also includes a processor configured to compute a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature (page 16, lines 24-26, 29-30; 58 in FIG. 8) and a display device for displaying the polyline (page 16, lines 30-32; 56 in FIG. 8).

Independent Claim 29 relates to a system for generating a plurality of spline control points that represent feature geometry (page 4, lines 12-14; FIG. 4). The system includes a first database (page 4, lines 15-16; 14 in FIG. 4) that stores a plurality of data points (page 4, lines 15-16; 14 in FIG. 4). The data points specify latitude and longitude coordinates of locations along a geographic feature (page 4, lines 26-29; 15 in FIG. 5). The system also includes a processor configured to apply a least squares approximation to the data points to generate the plurality of control points for a polynomial spline (page 5, lines 18-20; page 6, lines 24-26; 12 in FIG. 4). The system further includes a second database for storing the control point (page 6, lines 31-32, 16 in FIG. 4).

Dependent Claim 2 recites that the data points described in independent base Claim 1 are selected from the group consisting of coordinate pairs and coordinate triples (page 4, lines 27-28). Dependent Claim 3 recites that the method described in independent base Claim 1 further includes configuring the number of control points (page 6, lines 10-12, 24 in Figure 5).

Dependent Claim 4 recites that the polynomial spline described in independent base Claim 1 is selected from the group consisting of uniform nonrational B-spline, non-uniform

nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (page 6, lines 20-22). Dependent Claim 15 recites that the polynomial spline described in independent base Claim 14, dependent Claim 28 recites that the polynomial spline described in independent base Claim 23, and dependent Claim 35 recites that the polynomial spline described in independent base Claim 29 are also selected from the above listed group consisting of uniform nonrational B-spline, non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS (page 6, lines 20-22).

Dependent Claim 5 recites that the method described in independent base Claim 1 further includes defining a knot sequence for the polynomial spline (page 7, lines 28-30). Dependent Claim 6 recites that the method described in dependent base Claim 5 further includes manually defining the knot sequence (page 7, lines 28-30). Dependent Claim 7 recites that the method described in dependent base Claim 5 further includes storing the knot sequence in the second database (16 in FIG. 4).

Dependent Claim 8 recites that the method described in independent base Claim 1 further includes incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points (page 8, lines 22-25). Dependent Claim 9 recites that the method described in independent base Claim 1 further includes weighting a node included in the plurality of data points in the least squares approximation (page 8, line 29 – page 9, line 3). Dependent Claim 10 recites that the method described in independent base Claim 1 further includes employing regularization in computing the least squares approximation (page 10, lines 1-14).

Dependent Claim 11 recites that the method described in independent base Claim 1 further includes identifying a straight section of the at least one geographic feature (page 15,

lines 19-20, FIG. 6) and storing in the second database the data points corresponding to the straight sections (page 15, lines 22-24). Dependent Claim 12 recites that the method described in dependent base Claim 11 further includes computing control points for one or more curved sections of the at least one geographic feature (page 15, line 25, page 16, lines 10-11). Dependent Claim 13 recites that the method described in dependent base Claim 11 further includes computing control points such that the tangent to the spline approximation of a curved section of the at least one geographic feature and the tangent to the straight sections are equal at the point at which the curved and straight section meet (page 16, lines 5-8).

Dependent Claim 17 recites that the method described in independent base Claim 16 further includes identifying a straight section of a geographic feature based on the data points (page 15, lines 19-20, FIG. 6) and storing in the database the data points corresponding to the straight section (page 15, lines 22-24). Dependent Claim 18 recites that the method described in dependent base Claim 17 further includes computing control points only for one or more curved sections of the geographic feature (page 15, line 25, page 16, lines 10-11). Dependent Claim 19 recites that the method described in dependent base Claim 17 further includes computing control points for a geographic feature that has a curved section and an adjoining straight section such that a bearing value at an endpoint of the curved section equals a corresponding bearing value at an endpoint of the straight section that meets the curved section (page 16, lines 4-11).

Dependent Claim 20 recites that the method described in independent base Claim 16 further includes incorporating in the least squares approximation a bearing value associated with a node in the plurality of data points (page 8, lines 22-25). Dependent Claim 21 recites that the method described in independent base Claim 16 further includes weighting a node included in the plurality of data points (page 8, line 29 – page 9, line 3). Dependent Claim 22 recites that the

method described in independent base Claim 16 further includes employing regularization in computing the least squares approximation (page 10, lines 1-14).

Dependent Claim 24 recites that the spline control points described in independent base Claim 23 further are derived by incorporating in the least squares approximation a bearing value associated with a node in the plurality of data points (page 8, lines 22-25). Dependent Claim 25 recites that the spline control points described in independent base Claim 23 are derived using the least squares approximation by weighting a node included in the plurality of data points (page 8, line 29 – page 9, line 3). Dependent Claim 26 recites that the spline control points described in independent base Claim 23 are derived by employing regularization in computing the least squares approximation (page 10, lines 1-14). Dependent Claim 26 recites that the spline control points described in independent base Claim 23 are derived by employing regularization in computing the least squares approximation (page 10, lines 1-14). Dependent Claim 27 recites that the processor described in independent base Claim 23 is configured to determine whether the geographic feature includes a straight section, and if so, linearly interpolate the data points representing the straight section (page 15, lines 19-22).

Dependent Claim 30 recites that the processor described in independent base Claim 29 is configured to incorporate in the least squares approximation a bearing value associated with a node in the plurality of data points (page 8, lines 22-25). Dependent Claim 31 recites that the processor described in independent base Claim 23 is configured to weight a node included in the plurality of data points in the least squares approximation (page 8, line 29 – page 9, line 3). Dependent Claim 32 recites that the processor described in independent base Claim 29 is configured to employ regularization in computing the least squares approximation (page 10, lines 1-14). Dependent Claim 33 recites that the processor described in independent base Claim 29 is

configured to determine whether the geographic feature includes a straight section, and if so, to store in the second database the data points corresponding to the straight section (page 15, lines 19-24). Dependent Claim 34 recites that the processor described in independent base Claim 29 computes the control points only for one or more curved sections of the geographic feature (page 15, line 25, page 16, lines 10-11).

Dependent Claim 36 recites that the geographic feature described in independent base Claim 1 is a road (page 1, lines 13-15). Dependent Claim 37 recites that the data points described in independent base Claim 1 specify altitude (page 4, line 28).

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

(1) Claims 1-3, 8-14, 16-27, 29-34 and 36-37 stand rejected under 35 USC 102(b) as being anticipated by Sennott (U.S. Pat. No. 5,438,517),

(2) Claims 4, 15, 28 and 35 stand rejected under 35 USC 103(a) as being obvious over Sennott in view of Dayanand (U.S. Pat. No. 6,639,592),

(3) Claims 5-7 stand rejected under 35 USC 103(a) as being obvious over Sennott in view of Rohm (U.S. Pat. No. 6,253,164).

(7) ARGUMENT

A. Claims 1-3, 8-14, 16-27, 29-34 and 36-37 are not anticipated by Sennott.

1. Claims 1-3, 8-13, 29-34 and 36-37 are not anticipated by Sennott.

Appellants' independent Claim 1 relates to a method for representing geographic features including the step of fitting a polynomial spline to the geographic feature "*by applying a least squares approximation* to the data points specifying latitude and longitude coordinates to

generate a plurality of control points for the polynomial spline." Appellants' independent Claim 29 relates to a system for generating a plurality of spline control points including a processor configured to "*apply a least squares approximation* to the data points specifying latitude and longitude coordinates to generate the control points for a polynomial spline."

In the final Office Action, Appellants' independent Claims 1 and 29 were rejected as anticipated by Sennott. As explained below, Sennott fails to anticipate Claims 1 and 29 because Sennott fails to disclose *applying a least squares approximation* to data points specifying latitude and longitude coordinates to generate the control points for the polynomial spline.

The Sennott patent describes a system for operating autonomous vehicles. (See, Sennott: column 1, lines 12-16). According to the Sennott patent, an "autonomous vehicle" is a vehicle which is either completely automatic or substantially automatic without significant human involvement in the operation. (See, Sennott: column 12, lines 8-16). Part of the system disclosed by Sennott includes a navigator system by which the autonomous vehicles can follow an autonomous vehicle route. The autonomous vehicle route may be modeled using mathematical B-splines or clothoid curves. (See, Sennott: column 17, lines 47-55).

Although Sennott mentions that polynomial splines may be used to represent autonomous vehicle routes (See, Sennott: column 52, lines 1-2; column 56, lines 5-26), Sennott fails to disclose the Appellants' implementation of "*applying a least squares approximation*" to the data points specifying latitude and longitude coordinates to generate a plurality of control points for the polynomial spline. Applying least squares approximation to the data points is neither inherent in nor obvious in view of Sennott.

Rather, Sennott indicates that clothoid curves and B-splines are used as a mathematical representation of the vehicle route through a sequence of objective points. (See, Sennott: column

51, lines 24-25; column 52, lines 15-17). The objective points are locations "*the vehicle must attain*" along the route. (See, Sennott: column 51, lines 35-38). To realize this stated goal of the Sennott patent, the B-spline cannot be computed using the least squares approximation recited by the Appellants' independent claims. Rather, the Sennott patent would use an exact fit method of computing the B-spline which would guarantee that the vehicle route passes through the objective points. In contrast, computing the control points of the polynomial spline by applying a least squares approximation would not guarantee that the route passes through the objective points. One of ordinary skill in the art would know that the B-spline representing the vehicle route that passes through a series of objective points is not calculated by applying least squares approximation. Accordingly, the Sennott patent does not disclose the recited claim element of "*applying a least squares approximation*" to the data points specifying latitude and longitude coordinates to generate a plurality of control points for the polynomial spline.

Additionally, Appellants' respectfully point out that Sennott mentions least squares in contexts not related to polynomial splines; rather, Sennott mentions least squares in the context of the detection of obstacles. (See, Sennott: column 71, lines 15-20, 36-41; column 72, lines 31-40, 47-55). Specifically, Sennott discloses least squares for determining expected values for natural vertical elements of the road including road height, road crown and road bank. The Sennott autonomous vehicle may identify obstacles in the path detected by laser scans and filtered with the expected vertical road values. Sennott's disclosure of least squares for calculating expected *vertical* values of road height is totally unrelated to and does not suggest the Appellants' least squares approximation to data points specifying latitude and longitude (*horizontal*) to generate control points for the polynomial spline.

Accordingly, for at least these reasons, Sennott does not anticipate independent Claims 1, 29 and dependent Claims 2-3, 8-13, 30-34 and 36-37 which depend upon Claims 1 and 29.

2. Claims 14 and 23-27 are not anticipated by Sennott.

Appellants' independent Claim 14 relates to a method of displaying a function representing a geographic feature where the spline control points are derived *"using a least squares approximation"* from data points specifying latitude and longitude coordinates. Claim 14 also includes using the spline control points to generate the function representing the geometry of the geographic feature and *displaying the function* on the computing output device. Appellants' independent Claim 23 relates to a system for displaying a function representing the geometry of a geographic feature where the spline control points are derived *"using a least squares approximation"* from data points specifying latitude and longitude coordinates. Claim 23 also includes computing a polynomial spline using the spline control points and *displaying the polyline*.

In the final Office Action, independent Claims 14 and 23 were rejected as anticipated by Sennott. Claims 14 and 23 are not anticipated by Sennott for at least two reasons.

One of the reasons why Claims 14 and 23 are not anticipated by Sennott is the same reason why Claims 1 and 29 are not anticipated by Sennott. As explained above in connection with Claims 1 and 29, Sennott fails to disclose the spline control points being derived *using a least squares approximation* from data points specifying latitude and longitude coordinates. Although Sennott mentions that polynomial splines may be used to represent autonomous vehicle routes (See, Sennott: column 52, lines 1-2; column 56, lines 5-26), Sennott fails to disclose the Appellants' implementation of the spline control points being derived *using a least squares approximation* from data points specifying latitude and longitude coordinates. For the

reasons stated above in connection with Claims 1 and 29 applying least squares approximation from the data points is neither inherent in nor obvious in view of Sennott.

In addition, there is a second reason why Claims 14 and 23 are not anticipated by Sennott. Claim 14 also includes using the spline control points to generate the function representing the geometry of the geographic feature and *displaying the function* on the computing output device. Claim 23 also includes computing a polynomial spline using the spline control points and *displaying the polyline*. Sennott fails to anticipate Claims 14 and 23 because Sennott fails to disclose *displaying the polynomial spline function*. Rather, Sennott merely discloses using the B-spline to model the route that the autonomous vehicle is to navigate (See, Sennott: column 17, lines 47-55). The Advisory Action indicated that Sennott disclosed "the production of graphic images on the user interface (not shown) of the host processing system 188. The graphic images allow human users at the base station 188 to view the paths of the vehicle 102 as well as any other vehicles which are being navigated." Appellants respectfully point out that this display of Sennott is not the recited display of the polynomial spline function. Rather, the display of Sennott is merely a display of positions of mining vehicles 102 at a base station 188. (See, Sennott: Figure, 3). The base station communicates with the vehicle positioning system of each of the mining vehicles to obtain position information. (See, Sennott: column 33, lines 11-12, 37-40). The display in Sennott merely indicates the present and past positions of the mining vehicles and does not display the polynomial spline function that represents the geometry of the route. Therefore, for this additional reason, Appellants' Claims 14 and 23 are not anticipated by Sennott.

Accordingly, for at least these reasons, Sennott does not anticipate independent Claims 14, 23 and dependent Claims 24-27 which depend upon Claim 23.

3. Claims 16-22 are not anticipated by Sennott.

Appellants' independent Claim 16 relates to a method of generating a computer-usable database including the step of fitting a polynomial spline by computing a plurality of control points yielding the *"least squares approximation"* of the data points specifying latitude and longitude coordinates. In the final Office Action, Appellants' independent Claim 16 was rejected as anticipated by Sennott. As explained below, Sennott fails to anticipate Claim 16 because Sennott fails to disclose fitting a polynomial spline by computing a plurality of control points yielding the *"least squares approximation"* of the data points specifying latitude and longitude coordinates.

As discussed above in connection with Claims 1 and 29, the Sennott patent describes a system for operating autonomous vehicles that follows an autonomous vehicle route. (See, Sennott: column 1, lines 12-16). The autonomous vehicle route may be modeled using mathematical B-splines or clothoid curves. (See, Sennott: column 17, lines 47-55). Although Sennott mentions that polynomial splines may be used to represent autonomous vehicle routes (See, Sennott: column 52, lines 1-2; column 56, lines 5-26), Sennott fails to disclose the Appellants' implementation of fitting a polynomial spline by computing a plurality of control points yielding the *"least squares approximation"* of the data points specifying latitude and longitude coordinates. Applying least squares approximation to the data points is neither inherent in nor obvious in view of Sennott.

Rather, Sennott indicates that clothoid curves and B-splines are used as a mathematical representation of the vehicle route through a sequence of objective points. (See, Sennott: column 51, lines 24-25; column 52, lines 15-17). The objective points are locations "*the vehicle must attain*" along the route. (See, Sennott: column 51, lines 35-38). To realize this stated goal of the

Sennott patent, the B-spline would not be computed yielding the least squares approximation recited by the Appellants' independent claims. Rather, the Sennott patent would use an exact fit method of computing the B-spline which would guarantee that the vehicle route passes through the objective points. In contrast, computing the control points yielding the least squares approximation would not guarantee that the route passes through the objective points. Accordingly, the Sennott patent does not disclose the recited claim element fitting a polynomial spline by computing a plurality of control points yielding the *"least squares approximation"* of the data points specifying latitude and longitude coordinates.

Additionally, Appellants' respectfully point out that Sennott mentions least squares in contexts not related to polynomial splines; rather, Sennott mentions least squares in the context of the detection of obstacles as discussed above in connection with Claims 1 and 29.

Accordingly, for at least these reasons, Sennott does not anticipate independent Claim 16 and dependent Claims 17-22 which depend upon Claim 16.

B. Claims 4, 15, 28 and 35 are not obvious over Sennott in view of Dayanand.

Appellants' dependent Claims 4, 15, 28 and 35 are allowable at least for the reason that they depend upon allowable base claims. Additionally, Claims 4, 15, 28 and 35 are not obvious over the combination of Sennott and Dayanand because there is no suggestion that would motivate one of ordinary skill in the art to combine these references. Sennott relates to a system for operating autonomous vehicles that follows an autonomous vehicle route. (See, Sennott: column 1, lines 12-16). The autonomous vehicle route may be modeled using a B-spline or a clothoid curve. (See, Sennott: column 17, lines 47-55). Dayanand relates to a method for modeling complex three-dimensional shapes using curve networks. (See, Dayanand: column 2,

lines 9-13). There is no suggestion that would motivate to combine these references because the curve networks intended to model 3-D surfaces cannot be applied to the vehicle route of Sennott. The autonomous vehicle of Sennott follows a single route that may be modeled with a single curve not the curve networks of Dayanand. For this and numerous other reasons, one of ordinary skill in the art would not combine the Sennott and Dayanand references. Therefore, Appellants' dependent Claims 4, 15, 28 and 35 are not obvious over the combination of Sennott and Dayanand.

C. Claims 5-7 are not obvious over Sennott in view of Rohm.

Appellants' dependent Claims 5-7 are allowable at least for the reason that they depend upon allowable base claims. Additionally, Claims 5-7 are not obvious over the combination of Sennott and Rohm because there is no suggestion that would motivate one of ordinary skill in the art to combine these references. Sennott relates to a system for operating autonomous vehicles that follows an autonomous vehicle route. (See, Sennott: column 1, lines 12-16). The autonomous vehicle route may be modeled using a B-spline or a clothoid curve. (See, Sennott: column 17, lines 47-55). Rohm relates to a method for modeling a 3-D object. Rohm fits surfaces to a cloud of points associated with an object. (See, Rohm: column 2, lines 9-17). There is no suggestion that would motivate one to combine these references because the cloud of points and surfaces of an object cannot be applied to the vehicle route of Sennott. The autonomous vehicle of Sennott follows a single route that may be modeled with a single curve not the surfaces of Rohm. For this and numerous other reasons, one of ordinary skill in the art would not combine the Sennott and Rohm references. Therefore, Appellants' dependent Claims 5-7 are not obvious over the combination of Sennott and Rohm.

Appellants respectfully request the Board to reverse the rejection of Appellants' Claims 1-3, 8-14, 16-27, 29-34 and 36-37 as being anticipated by Sennott, reverse the rejection of Appellants' Claims 4, 15, 28 and 35 as being obvious over Sennott in view of Dayanand, and reverse the rejection of Appellants' Claims 5-7 as being obvious over Sennott in view of Rohm.

Respectfully submitted,

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(8) CLAIMS APPENDIX

1. A method for representing geographic features in a computer-based system, comprising:

providing a first computer-usable database storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature;

fitting a polynomial spline to the at least one geographic feature by applying a least squares approximation to the data points specifying latitude and longitude coordinates to generate a plurality of control points for the polynomial spline; and

storing the control points in a second computer-usable database, the control points being usable for representing the geometry of the at least one geographic feature in the computer-based system.

2. The method of claim 1, wherein the data points are selected from the group consisting of coordinate pairs and coordinate triples.

3. The method of claim 1, further comprising:

configuring the number of control points.

4. The method of claim 1, wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline, non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS.

5. The method of claim 1, further comprising:

defining a knot sequence for the polynomial spline.

6. The method of claim 5, further comprising:

manually defining the knot sequence.

7. The method of claim 5, further comprising:

storing the knot sequence in the second computer-usable database.

8. The method of claim 1, further comprising:

incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points.

9. The method of claim 1, further comprising:

weighting a node included in the plurality of data points in the least squares approximation.

10. The method of claim 1, further comprising:

employing regularization in computing the least squares approximation.

11. The method of claim 1, further comprising:

identifying a straight section of the at least one geographic feature; and

storing in the second computer-usable database the data points corresponding to the straight section.

12. The method of claim 11, further comprising:

computing the control points only for one or more curved sections of the at least one geographic feature.

13. The method of claim 11, further comprising:

computing the control points such that the tangent to the spline approximation of a curved section of the at least one geographic feature and the tangent to the straight section are equal at the point at which the curved and straight section meet.

14. A method of displaying on a computer output device a function representing a geographic feature, comprising:

retrieving from a computer-usable database a plurality of spline control points associated with the geographic feature, the spline control points being derived, using a least squares approximation, from a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature;

calculating a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature; and

displaying the function on the computer output device.

15. The method of claim 14, wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline, non-uniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS.

16. A method of generating a computer-usable database that represents feature geometry using a plurality of spline control points associated with a plurality of geographic features, comprising:

providing a predetermined database that represents feature geometry using a plurality of data points specifying latitude and longitude coordinates of locations along the geographic features;

for each of the geographic features, retrieving a corresponding set of data points specifying latitude and longitude coordinates from the predetermined database;

fitting a polynomial spline to each of the geographic features by computing a plurality of control points yielding the least squares approximation to the corresponding set of data points specifying latitude and longitude coordinates; and

storing the plurality of spline control points in the computer-usable database.

17. The method of claim 16, further comprising:

identifying a straight section of a geographic feature based on the data points; and

storing in the computer-usable database the data points corresponding to the straight section of the geographic feature.

18. The method of claim 17, further comprising:

computing the control points only for one or more curved sections of the geographic feature.

19. The method of claim 17, further comprising:

computing the control points for a geographic feature that has a curved section and an adjoining straight section such that a bearing value at an endpoint of the curved section equals a corresponding bearing value at an endpoint of the straight section that meets the curved section.

20. The method of claim 16, further comprising:

incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points.

21. The method of claim 16, further comprising:

weighting a node included in the plurality of data points.

22. The method of claim 16, further comprising:

employing regularization in the least squares approximation.

23. A system for displaying a function representing the geometry of a geographic feature, comprising:

a database storing one or more spline control points associated with the geographic feature, the spline control points being derived, using a least squares approximation, from a plurality of data points specifying latitude and longitude coordinates of locations along the geographic feature;

a processor configured to compute a polynomial spline using the spline control points to generate the function representing the geometry of the geographic feature; and

a display device for displaying the polyline.

24. The system of claim 23, wherein the spline control points are derived by incorporating in the least squares approximation a bearing value associated with a node included in the plurality of data points.

25. The system of claim 23, wherein the spline control points are derived using the least squares approximation by weighting a node included in the plurality of data points.

26. The system of claim 23, wherein the spline control points are derived by employing regularization in the least squares approximation.

27. The system of claim 23, wherein the processor is configured to determine whether the geographic feature includes a straight section, and if so, linearly interpolate the data points representing the straight section.

28. The system of claim 23, wherein the polynomial spline is selected from the group consisting of uniform nonrational B-spline, nonuniform nonrational B-spline, uniform Catmull-Rom spline, nonuniform Catmull-Rom spline and NURBS.

29. A system for generating a plurality of spline control points that represent feature geometry, comprising:

a first computer-usable database for storing a plurality of data points specifying latitude and longitude coordinates of locations along at least one geographic feature;

a processor configured to apply a least squares approximation to the data points specifying latitude and longitude coordinates to generate the plurality of control points for a polynomial spline; and

a second computer-usable database for storing the control points.

30. The system of claim 29, wherein the processor is configured to incorporate in the least squares approximation a bearing value associated with a node included in the plurality of data points.

31. The system of claim 29, wherein the processor is configured to weight a node included in the plurality of data points in the least squares approximation.

32. The system of claim 29, wherein the processor is configured to employ regularization in computing the least squares approximation.

33. The system of claim 29, wherein the processor is configured to determine whether the at least one geographic feature has a substantially straight section, and if so, to store in the second computer-usable database the data points corresponding to the straight section.

34. The system of claim 33, wherein the processor computes the control points only for one or more curved sections of the at least one geographic feature.

35. The system of claim 29, wherein the polynomial spline is selected from the group consisting of a uniform nonrational B-spline, nonuniform nonrational B-spline uniform Catmull-Rom spline, nonuniform Catmull-Rom spline, and NURBS.

36. The method of claim 1, wherein the geographic feature is a road.

37. The method of claim 1, wherein the data points further specifying altitude.

(9) EVIDENCE APPENDIX

There is no evidence to include with this appeal.

(10) RELATED PROCEEDINGS APPENDIX

There are no related proceedings.